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SPECIFICATION FOR FILTER PRESSES, RECESSED PLATE TYPE, AND PLATE AND FRAME TYPE

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SPECIFICATION FOR FILTER PRESSES, RECESSED PLATE TYPE, AND PLATE AND FRAME TYPE

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Indian Standard

SPECIFICATION FOR FILTER PRESSES, RECESSED PLATE TYPE, AND PLATE AND FRAME TYPE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 March 1969, after the draft finalized by the Chemical Engineering Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 The recessed plate, and plate and frame filter presses were the pioneer pressure type filters and now find application in many branches of the industry. The filter press consists essentially of a skeleton framework made up of two end supports connected by two parallel, horizontal bars or flats. On these bars or flats a varying number of filter chambers is assembled. These chambers are formed either by cloth covered recessed filter plates, or by alternate hollow frames and cloth covered plates. The plates and frames are provided with external handles or lugs, for supporting them on horizontal bars or flats. Customarily a screw or hydraulic ram, fitted with a closing mechanism for forcing the plates and frames together towards a fixed head, is situated on one end of filter press and operates against the movable head, with cloth acting as gasket and filtering surface. In recess type, the solids are collected in between the hollow of two successive plates. A regular hollow frame is provided for the solids, in case of plate and frame type of press where the plates are flush.

The advantages of these presses are simple construction, lower initial and operating cost, simplicity of operation and dryness of cake obtained.

0.3 Information to be supplied by the manufacturer along with the press is given in Appendix A.

1. SCOPE

1.1 This standard covers the material of construction, sizes and testing of recessed plate, and plate and frame type filter presses.

2. MATERIALS OF CONSTRUCTION

2.1 The plates and frames may be constructed of any material that may be machined, cast or moulded into shape and has adequate strength and corrosion resistance under the conditions of service.

2.1.1 In Appendix B will be found a list of specifications to which metallic materials used in the construction of filter presses shall conform.

2.1.2 Wood where used as material of construction shall be thoroughly seasoned and reasonably free from knots, rot, etc. Materials to be used for stay rods, nuts, washers, and supporting handle shall also be specified.

2.1.3 The plates and frames may also be lined with lead, rubber or with a suitable plastic material. It may be epoxy coated, tinned, or galvanized.

3. CONSTRUCTION

3.1 The plates and frames may be either square or circular in shape and shall be of any one of the following sizes:

200, 400, (500), 630, 800, (915), 1 000, 1 200, (1 500) mm.

The values in brackets are second preference values and shall be avoided where possible. These sizes pertain to the dimensions of the outer machined portion of the plate and frame. The width of the contact area or gasket may vary depending on the working pressure and the type of the press made these variations being permitted only on the inner edges.

3.2 Plates

3.2.1 *Types* — The plates may be recessed type for centre feed and flush type for plate and frame presses. Plates may be provided with passages for circulation of heating or cooling fluids, the fluids being circulated either through suitable flexible hoses or by passages with rubber collars at the sides. Grooves may be provided in the gasket or joining surfaces of the plates to take rubber or other suitable gaskets for sealing. Leakage grooves may be provided for controlling the leakage through joining surfaces.

To reduce the capacity of the press, dummy plates may be provided.

3.2.2 *Drainage Surface* — The drainage surface of plates could be pyramidal, vertical-grooved, radial or screened.

3.2.3 *Finish* — The machined contact surfaces of a plate and/or a frame shall be parallel to within 0·4 mm per metre length. All the corners and edges shall be suitably rounded to increase the life of the filter cloth.

3.3 Filter Cloth Support — The type and dimensions of the supports for filter cloth are left to the discretion of the manufacturer. In high pressure filter presses, perforated metal sheets or wire-mesh screens may be provided for the support of the filter media. When perforated metal screens are used for supporting filter medium an arrangement shall be made for holding them on the plate.

3.4 Side Supports — The side supports could be of either rectangular or circular cross section, the dimensions being choosen on the basis of the maximum permissible deflection. The dimensions of the flats or bars used for the side supports shall comply with those specified in IS : 1731-1961* and IS : 1732-1961†. Side supports may be suitably coated or clothed to avoid corrosion due to drippage or splashing.

If plates and frames are to be shifted mechanically, they may be supported from the top portion.

3.5 Feed Wash Inlets, Outlets and Air Vents — These may be located internal to the joining surfaces or external to these depending on the process and the press used. The delivery of the filtrate and/or wash liquor shall be through either screwed-in or flanged cocks or through tapered wooden cocks in the case of wooden plates or through a closed channel as in the case of closed delivery type of presses.

Air vent cocks for venting and sampling shall be provided on closed delivery presses.

3.6 Assembly — The plates and frames shall be located centrally between the side supports. The feed holes shall be located with reference to any of the side supports to minimize the resistance to flow of slurry and the lateral movement of plates and frames, and to avail maximum contact of joining surfaces.

3.7 Closing of the Press — Closing of the press could be mechanical or hydraulic with hand or power pump. Presses of size 800 mm and over should preferably have hydraulic closing.

3.8 Identification Marks — One dot or lozenge or button shall be put on the wash outlet plate, two on the frame and three for the wash inlet plate to identify the plate and frame used in the press. Location of these shall be on one side of the press and shall be prominently visible.

4. TESTING

4.1 The press in the closed condition together with the filter medium shall be subjected to a proof pressure of 5 kgf/cm^2 or 1·5 times the working pressure to which the press has been designed, whichever is greater, for a period of at least 15 minutes. Wooden presses shall be pressure tested on site before the use only.

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*Dimensions for steel flats for structural and general engineering purposes. (Since revised).

†Dimensions for round and square steel bars for structural and engineering purposes. (Since revised).

APPENDIX A

(*Clause* 0.3)

INFORMATION TO BE SUPPLIED BY THE MANUFACTURER ALONG WITH THE PRESS

a) Size in mm^2;
b) Number of plates;
c) Filter area (net) in m^2;
d) Number of frames;
e) Thickness of frames in mm;
f) Cake capacity of the press in litres or m^3;
g) Type of closing;
h) Type of delivery;
j) Weight of empty in kg;
k) Area (floor area) occupied by press when open in m^2;
m) Material of construction of liners, in case of wooden press; and
n) Locations of feed, wash, filtrate and wash water outlet.

APPENDIX B

(*Clause* 2.1.1)

LIST OF MATERIAL SPECIFICATIONS

a) IS : 210-1970 Specification for grey iron castings (*second revision*)
b) IS : 305-1961 Specification for aluminium bronze ingots and castings (*revised*)
c) IS : 306-1968 Specification for tin bronze ingots and castings (*second revision*)
d) IS : 617-1959 Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (*revised*)
e) IS : 1028-1970 Specification for silicon bronze ingots and castings (*first revision*)
f) IS : 1030-1974 Specification for carbon steel castings for general engineering purposes (*second revision*)
g) IS : 1570-1961 Schedules for wrought steels for general engineering purposes
h) IS : 2107-1962 Specification for whiteheart malleable iron castings
j) IS : 2108-1962 Specification for blackheart malleable iron castings
k) IS : 2640-1964 Specification for pearlitic malleable iron castings

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg.1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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